Connecting, interacting and supporting

Brouwer, Jasperina

Chapter 3
The importance of small group teaching for peer and faculty interaction, self-efficacy, and early study success

Having established in Chapter 2 that peer consideration relates to self-efficacy (expectancy), and self-efficacy relates to study success in the first semester, Chapter 3 then moves on to investigate differences between learning communities and mentor groups, as two types of small group teaching, together with the effects of peer and faculty interactions (i.e., among students or with a mentor or teacher) on self-efficacy and study success during the first semester. Learning communities enable students to meet and collaborate more frequently and ensure that students attend all lectures in the same group. Students in mentor groups instead meet once a week with the same small group of students, but they might attend their other courses with other groups of students.[4]

[4] This chapter is based on Brouwer, J., Jansen, E.P.W.A., Hofman, W.H.A., & Flache, A. (2016). Een goed begin is het halve werk: Het belang van kleinschalig onderwijs voor de interactie, zelfeffectiviteit, en studiesucces in het eerste semester [Well begun is half done: The importance of small group teaching for interaction, self-efficacy and study success in the first semester]. *Pedagogische Studiën, 93*(3), 119-135.

Abstract. Small group teaching increasingly is implemented by universities, in several forms. This survey study considers learning communities and mentor groups as two prominent forms. The comparative analysis of these two small group teaching methods highlights some key differences: Learning communities are small groups that attend all courses together during the first semester, whereas mentor groups meet once per week. In learning communities, students thus have more contact and more possibilities for collaboration. This peer and faculty (student-mentor/teachers) interaction may have positive effects on self-efficacy and early study success, such that the relationships would be stronger in learning communities than in mentor groups. Survey data come from 407 first-year social sciences students from the 2013–2014 cohort. Psychology and sociology students were arranged in learning communities; pedagogical sciences students were in mentor groups. The multilevel analyses showed that contact hours and peer and faculty interaction relate positively to self-efficacy and self-efficacy relate positively to early study success. For students in learning communities, the positive effect of faculty interaction on self-efficacy is stronger than that for students in mentor groups. These results suggest a role for teachers and mentors, who can enhance peer and faculty interaction and self-efficacy and thereby exert a small but important effect on study success rates.
Keywords: learning communities, interaction, motivation, study success, higher education.

3.1 Introduction

As the numbers of university students have increased, the student population also has grown more heterogeneous in its needs, expectations, and background characteristics (Beerkens-Soo & Vossensteyn, 2009). Accordingly, some new students face difficulties meeting academic requirements, such that approximately 37% of Dutch university students drop out or switch their study programs during or immediately following their first year (Dutch Inspectorate of Education, 2014). In striving for a more efficient educational system, with a higher percentage of graduated students in a shorter time, the Dutch government entered into performance agreements with universities in the Netherlands in 2012 that encouraged expanding the curriculum to ensure more interaction among students and between students and teachers (Dutch Inspectorate of Education, 2011; OCW, 2007, 2015; Te Winkel & Juist, 2012). At a university in the northern Netherlands for example, learning communities have been implemented by several educational programs, and in the Faculty of Behavioural and Social Sciences (the context for the current study), mentor groups for the Pedagogical Sciences program coexisted with learning communities in the Psychology and Sociology programs during 2013–2014. Both these approaches represent small group teaching, but students in learning communities attend all lectures with the same group (i.e., their community), collaborating and meeting frequently, whereas students in mentor groups meet only during a weekly mentor group meeting (University of Groningen, 2012; for a detailed description of the educational programs, see Section 3.2.1). An assumption underlying the shift from mentor groups to learning communities is that students' interaction with peers and faculty (i.e., mentor, teacher) increases and enhances their scholastic performance because they meet more frequently and collaborate more with the

same group of peers. Therefore, this research seeks to offer an empirical comparison of these two forms of small group teaching to determine their influences on students' peer and faculty interaction, and accordingly, their self-efficacy and study success in the first semester (i.e., early study success).

3.1.1 Collaborative learning in small group teaching

Collaborative learning is frequently adopted in higher education settings, especially as a means to prepare students for their professional careers, in which teamwork is often required (Casner-Lottto & Barrington, 2006). Yet it also aims to enhance scholastic results and motivation, by increasing interactions among students and with teachers (O'Donnell, 2006). In terms of Vygotsky's (1978) social constructive theory, cognitive growth results from social interaction, and in small groups, students can support and teach one another, thus improving their learning. Teachers and mentors have important roles for making the peer tutoring possible and adapting their instruction to the demonstrated skills and potential of the students in the group (O'Donnell, 2006).

Whereas Vygotsky's (1978) theory emphasizes cognitive growth through collaboration, Tinto's (1993) interactionist model looks at how social and academic integration might prevent students' attrition. However, Tinto also revised the definitions of social and academic integration over time, which may have led to inconsistent conceptualizations across prior studies. For example, Beekhoven, De Jong, and Van Hout (2002) make little distinction between social and academic integration and instead use the general concept of integration. Meeuwisse, Severiens, and Born (2010) refer specifically to the concepts of social and academic interaction, which offers a more straightforward conceptualization of students' experiences. We adopt this latter approach and use the term peer interaction to refer to social interaction, defined as interactions among students; faculty interaction represents the academic interaction construct, or interactions of students with their teachers and mentors.

3.1.2 Transition to university

Several studies emphasize that the transition to university is a stressful period (Christie, Munro, & Fisher, 2004); in particular, students struggle to establish close contacts when they start, often due to the sheer size of large universities (Rausch & Hamilton, 2006). Furthermore, most students enter university during a key developmental stage, so-called emerging adulthood, such that they are undergoing several transitions simultaneously. In addition to the new educational contexts and lessons they are receiving, they might start a new job to help pay their tuition or living expenses, and many of them leave their parental homes. As they grow increasingly independent of their parents, they also take more responsibility for their decisions and finances (Arnett, 2004). In this dynamic transition to the university, youth need to build new social networks with friends and peers who can provide emotional and practical support (Buote et al., 2007; Wilcox, Winn, & Fyvie-Gauld, 2005) and help the students avoid academic failure. Early failures can initiate downward spirals, producing decreasing self-esteem, demotivation, and discouragement (Reichart, 2007; Wigfield, Byrnes, & Eccles, 2006). Therefore, new students need relevant support to

build their new social networks, as can be facilitated through small group teaching methods.

3.1.3 Learning communities

Learning communities have appeared in classrooms in the United States for years. In the early twentieth century, educational reformers sought to implement learning communities in the curriculum, and since then, this small group teaching method has boomed and adapted (Smith, MacGregor, Matthews, & Gabelnick, 2004). New iterations include thematic learning communities, learning communities for a specific group (i.e., excellence), living-learning communities, and cohorts of students who interact closely, both among themselves and with teachers (e.g., "Freshmen Interest Groups"; Lenning & Ebbers, 1999; MacGregor, Smith, Matthews, & Gabelnick, 1997; Smith et al., 2004). In a broad definition, learning communities are intentionally formed groups of students, who get to know one another and feel as if they belong together (Smith et al., 2004; Tinto, 2000). Knowledge gets shared in learning communities, as do responsibilities, because students often collaborate on assignments (Tinto, 2000; Zhao & Kuh, 2004).

When relatively unfamiliar persons interact daily in a close context, the proximity effect tends to lead to friendships, such that each person learns the others' opinions, attitudes, and characteristics, and they judge one another more positively because they expect to interact on a daily basis (Fehr, 1996; Van Duijn, Zeggelink, Huisman, Stokman, & Wasseur, 2003; Wimmer & Lewis, 2010). For first-year students in learning communities for example, most new students do not know one another, but they realize that they will collaborate on all their educational activities during their first semester. They get to know one another quickly, and develop friendship relations, as well as collaboration preferences and insights into which fellow students to ask for help.

3.1.4 Interaction and self-efficacy

Self-efficacy is the internal perception that the person will succeed in a certain task or domain (Bandura, 1977b, 1997). Academic self-efficacy, or self-confidence in one's own capabilities to succeed, offers an important predictor of study success (Richardson, Abraham, & Bond, 2012; Robbins et al., 2004) and also contributes to a feeling of being well-prepared for university study and a successful transition (Byrne & Flood, 2005).

Prior literature identifies four key sources of self-efficacy: previous positive experiences ("I succeeded in high school, so I will succeed now too"), vicarious learning or observation of others ("If my friend can pass that exam, I can too"), verbal convincing and encouragement ("You can pass if you study hard!"), and emotional and physical reactions (e.g., anxiety can undermine self-efficacy; Bandura, 1977b; Usher & Pajares, 2008). Vieno, Santinello, Pastore, and Perkins (2007) also indicate that different forms of social support, such as from friends and peers, can enhance self-efficacy. Accordingly, peer and faculty interaction should help enhance the self-efficacy of students who observe their peers passing exams or receive encouragement and motivation from their fellow students. Stefanou and Salisbury-Glennon (2002) confirm that different forms of learning communities contribute positively to self-efficacy.

3.1.5 Current study

This study focuses on two forms of small group teaching, embedded in the university curriculum for first-year students. With an exploratory research design, we investigate the extent to which peer and faculty interaction relate to self-efficacy and then to early study success. We also address the empirical differences between learning communities and mentor groups in this respect. Our theoretical foundation leads us to expect positive relationships of peer and faculty interaction with self-efficacy and early study success in both learning communities and mentor groups (hypothesis 1), though the relationship may be stronger with the former approach, because learning communities feature more contact hours and more collaboration with a fixed, persistent group, as well as with mentors and teachers (hypothesis 2). The greater interaction, in both time and intensity, can contribute more to self-efficacy and early study success, because students likely encourage one another, know whom to ask for help, and can identify the best partners for collaboration.

Therefore, this study addresses two key research needs. First, we require more context-specific investigations of small group teaching. International research into learning communities has been fruitful, providing evidence of their positive effects on study results (Butler & Dawkins, 2008; Hill & Woodward, 2013; Hotchkiss, Moore, & Pitts, 2006; Stassen, 2003), study engagement (Inkelas & Weisman, 2003; Pike, Kuh, & McCormick, 2011; Stassen, 2003; Zhao & Kuh, 2004), student satisfaction (Fleming et al, 2013; Zhao & Kuh, 2004), self-efficacy (Stefanou & Salisbury-Glennon, 2002), and the transition from secondary education to university (Inkelas, Daver, Vogt, & Leonard, 2007). A critical evaluation of learning communities in the contemporary Dutch university context also is necessarily, because this setting differs from the education systems of many European counties, as well as the United States, where many of the preceding studies have been conducted (Beekhoven et al., 2002). Other studies focus on campus universities, or so-called living-learning communities (see Inkelas et al., 2007; Inkelas & Weisman, 2003), where students live and study. In contrast, in the Dutch context, students generally leave their parental homes and move to the city where the university is located, where they rent a room, or else they remain at home and travel to the university's city daily. Approximately one-third of Dutch university students stay at their parental homes (Dienst Uitvoering Onderwijs [Dutch Ministry of Education, Culture, and Science], z.j.). Moreover, participation in learning communities in the United States usually is voluntary (Buch & Spaulding, 2011; Hotchkiss et al., 2006; Rocconi, 2011), but for this research, the learning communities are formally embedded in the study program and mandatory for students. These differences likely affect the extent of the resulting peer and faculty interactions, which highlights the need for context-specific research.

Second, we focus on the period immediately following students' transition to the university. Little research has focused on this early, starting period, despite its potentially crucial impacts in terms of avoiding early failure. Learning communities are particularly important in this early effort, as tools to build new networks with fellow students, as well as with teachers and mentors.

3.2 Method

3.2.1 Description of educational programs

At a research university in the northern Netherlands, the academic year is divided into four blocks of seven weeks, each followed by two exam weeks, and every semester consists of two blocks. The first semester focuses on basic knowledge of the discipline, with mainly introductory courses. In 2013–2014, the Psychology and Sociology programs implemented learning communities: Students were divided into groups of 12–13 and attended, with this same, fixed group, all educational meetings during the first semester. As aforementioned, participation in the learning communities was mandatory.

In the Psychology program, students also are assigned a teacher as a mentor and a student mentor. Learning communities revolve around an Academic Skills course, with weekly mandatory group meetings that focus on academic writing, critical thinking, study behaviors, career preparation, and professionalization. The mentor teaches this course and conducts feedback meetings with the students to discuss, among other things, their study progress. The meetings generally encourage trusting relationships, because they allow for discussions of both academic and personal challenges and circumstances. In the Sociology program, the learning communities instead revolve around a Study Work Group course, with one weekly, mandatory meeting that focuses on study skills. This course is supervised by a work group supervisor, or mentor. Extracurricular activities are not formally part of the program, but they can be organized by either the students or the mentor. After the first semester, students in these learning communities see one another during meetings of their Academic Skills or Study Work Groups, but the composition of the group changes for their other courses.

During 2013–2014, the Pedagogical Science program instead retained the existing practice of using mentor groups, rather than switching to learning communities. In this program, the mentor groups have an assigned, fixed mentor, who supervises the weekly, mandatory meetings during the first three blocks of the first year. These meetings cover academic writing, presentations, discussions, and exam preparation.

The group composition of the learning communities of 12–13 students thus remains constant for all academic efforts in the first semester, including lectures, tutorials, and practicums. In contrast, students of the mentor groups participate in one mandatory meeting per week but take courses independently. Compared with students in mentor groups, students in learning communities thus meet more frequently and collaborate more on assignments across their various courses. They communicate during meetings, take group assignments, and provide feedback. Table 3-1 summarizes these differences between learning communities and mentor groups.

Table 3-1. Characteristics of learning communities and mentor groups

	Learning Communities ***Psychology (P)*** ***Sociology (S)***	Mentor groups ***Pedagogical Sciences***
Core/central course	Academic Skills (P) Study Work Groups (S)	Mentor groups
Group size	12–13 students	12–13 students
Frequency	All lectures and tutorials. Collaboration during all lectures, tutorials, and group assignments.	Weekly meetings. Collaboration and group assignments during the mentor group meeting.
Composition	Based on enrollment. Fixed group composition for all courses in the first semester. Thereafter, fixed composition only for the central course.	Based on enrollment. Fixed group composition only during the mentor groups meeting, once a week for three blocks.
Mentor supervision	During regular meetings and three times a year in feedback meetings (P). During meetings (S).	During the weekly meetings.

3.2.2 Sample

For the current study, we use the 2013–2014 cohort from the Psychology, Sociology, and Pedagogical Sciences programs. The sample consists of 407 first-year students (22% male, 78% female) with an average age of 19 years. In total, Psychology and Sociology maintain 30 learning communities, and Pedagogical Sciences runs 18 mentor groups, all with group sizes of 12–13 students.

In line with the approval obtained from the ethical committee, students were informed about the aims of the research, the procedure, and the anonymous data storage in advance. Participation was completely voluntary, and the central administration requested participants' written consent to use the study results. Nineteen students chose not to give consent for the use of their study results and thus were excluded from the analysis.

3.2.3 Variables

Dependent variables

Early study success refers to study success at the end of the first semester, defined as weighted average grades and obtained credit points (or European credits), relative to the total credit points that could have been obtained by the end of the first semester. *Self-efficacy* (8 items; $\alpha = .70$) is based on the expectancy value theory (Wigfield & Eccles, 2000) and measured with the Motivated Strategies for Learning Questionnaire. Expectancies in this model connect with self-efficacy (Bandura, 1977b; Pintrich, Smith, Garcia, & McKeachie, 1991) and refer to the extent that the student believes he or she can accomplish a task, such as "I expect that I can get good grades this block." The possible responses to each item appeared on a scale from 1 ("fully disagree") to 5 ("fully agree"). In the analyses with *early study success* as a dependent variable, *self-efficacy* is the independent variable.

Independent variables at two levels

At the first, student level, we include five variables. *Peer interaction* (8 items; α = .83) measures the perceived interaction of each student with his or her fellow students, such as "I work well with fellow-students." *Faculty interaction* (5 items; α = .75) similarly measures the perceived interaction with teachers and the mentor, including an item that notes, "Teachers take the time to answer my questions, e.g., after a lecture." Both interaction scales came from previous research (Boom & Pennink, 2012; Severiens, Ten Dam, & Blom, 2006), and the items were measured on a five-point scale, from 1 ("fully disagree") to 5 ("fully agree"). We control for gender, as well as for early study success, measured as the student's secondary education results (i.e., *Prior achievement*), because previous research has shown that such achievement relates strongly to study success (Bruinsma & Jansen, 2005; Richardson et al., 2012). The information about achievement in secondary education came from the central administration, summarizing each student's average exam grades on core courses in Dutch language and literacy, English language and literacy, and math (cf. Severiens et al., 2011). As a control variable for self-efficacy, we include a comparable measure for self-efficacy in secondary education; this *Prior skills* variable (13 items; α = .71) measures self-estimates of acquired or mastered skills at the beginning of the program. Specifically, the survey asked about feelings of "readiness" for the university, according to the Readiness and Expectations Questionnaire (REQ; Jansen & Van der Meer, 2012). An example item read, "I am good at planning and organizing my studies," with a five-point scale of 1 ("fully agree") to 5 ("fully agree").

At the second, program level, we compare *Learning communities (LC)* with mentor groups, using a dichotomous variable. *Contact hours* (number of hours per semester) that the students have in learning communities differ from and are greater than those of the mentor groups.

3.2.4 Statistical analysis

The nested data structure with two levels leads us to perform a multilevel analysis, using MlWiN version 2.33 (Rasbash, Browne, Healy, Cameron, & Charlton, 2015). We estimate random intercept models with a maximum likelihood (ML) method, centered around the grand mean, and build the models with a stepwise approach. Prior studies reveal that self-efficacy and prior achievement are closely related to study success (Richardson et al., 2012; Robbins et al., 2004), which could induce a suppression effect if all the variables are included at the same time in a single model. Therefore, we started with null models for self-efficacy and for early study success, then added the independent first- and second-level variables of interest: peer and faculty interaction and learning communities (with mentor groups as the reference category). If significant main effects emerge, we add interaction terms to test for differences between learning communities and mentor groups. Self-efficacy, contact hours, and the control variables enter the model later to reveal the contributions of peer and faculty interaction. Any non-significant interaction terms were excluded from the model.

The intraclass correlation coefficient (ICC^1) represents how much variance is determined by groups, relative to the total variance. The explained variance at each level

reflects the ratio of the divided variance per level compared with the variance in the null model.[2] To determine if model fit significantly improves after adding the independent variables, we check the reduction in the deviance of two nested models with a Chi-square test. That is, the difference in deviance is the value of the test statistic with a χ^2 distribution ($\alpha = .05$), and differences in the parameters correspond to the number of degrees of freedom (Hox, 2010; Snijders & Bosker, 2012).

The proportion of missing values varies between 2% and 12% on the scale variables. The missing values are related to the observed data, not the dependent variable, suggesting that they are missing at random (De Leeuw, Hox, & Huisman, 2003; Little & Rubin, 1987). For variables with more than 10% missing values, we imputed values five times with Amelia View version 1.6.4. (Honaker, King, & Blackwell, 2008; Little & Rubin, 2002). Follow-up analyses showed that the mean scores of the imputed data did not differ significantly from the mean scores of the non-imputed data.

3.3 Results

3.3.1 Descriptive statistics

Table 3-2 contains the correlations and descriptive statistics for the variables across all students, as well as separated into learning communities and mentor groups. The comparison of learning communities with mentor groups reveals that average scores on faculty interaction are higher in the mentor groups, whereas those for peer interaction and self-efficacy are higher in the learning communities. For early study success, we find slightly higher average scores in the mentor groups than in the learning communities; prior achievement and prior skills (indicators of capabilities and self-efficacy, respectively) instead are similar across groups of students as they start at the university. The correlations show that the control variable prior achievement relates significantly and positively to early study success ($r = .36$, $p < .001$); a nearly identical correlation arises between prior skills with self-efficacy ($r = .35$, $p < .001$). Self-efficacy is significantly and positively related to early study success. Although peer and faculty interaction relate positively to self-efficacy, they do not relate to early study success.

Table 3-2. Correlations and descriptive statistics: Total sample and separate learning communities and mentor groups

	Prior achievement	Prior skills	Self-efficacy	Faculty interaction	Peer interaction	Study success
Prior achievement	1.00					
Prior skills	.03	1.00				
Self-efficacy	.15*	.35**	1.00			
Faculty interaction	-.10	.17*	.19**	1.00		
Peer interaction	-.07	.30**	.20**	.31**	1.00	
Study success semester 1	.36**	.07	.20**	.04	.05	1.00
Average	6.67	3.60	3.41	3.70	3.89	6.38
SD	0.57	0.41	0.43	0.62	0.47	1.41
Minimum	5.33	2.15	2.13	1.40	1.38	0.63
Maximum	8.33	4.77	4.86	5.00	5.00	8.90
Learning Communities (LCs)						
Average	6.67	3.60	3.43	3.68	3.91	6.37
SD	0.58	0.40	0.45	0.63	0.49	1.47
Minimum	5.33	2.46	2.13	1.40	1.38	0.63
Maximum	8.33	4.77	4.86	5.00	5.00	8.90
Mentor Groups (MGs)						
Average	6.67	3.60	3.31	3.80	3.81	6.43
SD	0.52	0.44	0.34	0.58	0.42	1.09
Minimum	6.00	2.15	2.50	1.96	2.63	2.23
Maximum	8.33	4.77	4.00	4.94	4.80	8.07

Note. N_{total} = 407; N_{LCs} = 333; N_{MGs} = 74; one student was not placed in a group.
$^{**}p \leq .001$ $^{*}p \leq .05$.

3.3.2 Learning communities versus mentor groups and self-efficacy

Table 3-3 contains the results of a multilevel analysis with self-efficacy as the dependent variable. The random intercept model indicates an intercept of 3.41, reflecting the average level of self-efficacy expressed by average students in an average group. In other words, this is the value of self-efficacy we would expect from a randomly chosen student from a randomly chosen population of groups. Differences in self-efficacy reflect the individual level. A comparison with the total variance for self-efficacy reveals, according to the ICC value of 0, that it does not result from differences at the level of learning communities or mentor groups.[3] In an educational context, a low ICC is common, especially for non-cognitive factors such as self-efficacy (Van Landeghem, Van Damme, Opdenakker, De Fraine, & Onghena, 2002). In Model 1, peer and faculty interaction and learning communities have significantly positive effects on self-efficacy, and the model represents a

significant improvement in fit ($\chi^2(3) = 29.53$, $p < .001$). In Model 2, the interaction effect of faculty interaction with learning communities relates positively to self-efficacy, and again, model fit improves significantly ($\chi^2(1) = 4.05$, $p < .05$). We find no significant interaction effect between peer interaction and learning communities though, so we remove it from the model. Model 3 shows that the number of contact hours is positively related to self-efficacy, with improved model fit ($\chi^2(1) = 3.85$, $p < .05$). Finally, we add the control variables. With gender in Model 4, the significant results remain the same as those in Model 3. With skills as an indicator for self-efficacy when entering the university, we find a significant link to self-efficacy, similar to gender and contact hours. Peer interaction and the interaction term between faculty interaction and learning communities no longer appear significant. Model fit improves significantly ($\chi^2(1) = 44.21$, $p < .001$) and explains 21.6% of the variance on the student level.

Table 3-3. Multilevel analysis of self-efficacy predictors after the first semester

	Model 0 B (SE)	Model 1 B (SE)	Model 2 B (SE)	Model 3 B (SE)	Model 4 B (SE)	Model 5 B (SE)
Fixed effects						
Intercept	3.411** (0.021)	3.314** (0.049)	3.329** (0.049)	3.382** (0.056)	3.641** (0.074)	3.613** (0.072)
Faculty interaction		0.107* (0.035)	-0.049 (0.085)	-0.054 (0.085)	-0.066 (0.082)	-0.017 (0.080)
Peer interaction		0.130* (0.046)	0.131* (0.046)	0.150* (0.047)	0.164** (0.045)	0.078 (0.046)
Learning communities (LCs)		0.117* (0.054)	0.103 (0.054)	0.038 (0.063)	-0.040 (0.063)	-0.020 (0.062)
Faculty interaction×LCs			0.185* (0.092)	0.184* (0.091)	0.191* (0.088)	0.113 (0.087)
Contact hours				0.006* (0.003)	0.008* (0.003)	0.007* (0.003)
Control variables						
Gender					-0.251** (0.049)	-0.236** (0.048)
Prior skills						0.320** (0.051)
Variance						
Student	0.185 (0.013)	0.172 (0.012)	0.170 (0.012)	0.169 (0.012)	0.159 (0.011)	0.145 (0.010)
LCs	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Explained variance						
$R^2_{\text{level 1}}$		7.03%	8.11%	8.65%	14.05%	21.62%
Model fit						
Deviance statistic (-2*log-likelihood)	467.366	437.832	433.787	429.934	404.338	360.132
Estimated parameters	3	6	7	8	9	10

Note. Adding the interaction term for peer interaction×LCs did not provide significant results and thus was removed from Model 2. For gender, the reference category is men. For learning communities, the reference category is mentor groups.
**p ≤ .001 *p ≤ .05.

3.3.3 Learning communities versus mentor groups and early study success

In Table 3-4 we provide the results of the multilevel analysis with early study success as the dependent variable. The null model has an intercept of 6.37; the ICC indicates that 6.7% of variance is explained by differences at the learning communities or mentor groups level. In Model 1, we find that faculty interaction relates significantly and positively to early study success. After adding self-efficacy in Model 2, self-efficacy relates significantly and positively to early study success, but faculty interaction does not anymore, indicating that self-efficacy relates more powerfully to early study success than does faculty interaction. The fit of Model 2 compared with Model 1 improves significantly ($\chi^2(1) = 14.03$, $p < .001$). In Model 3, adding the second-level contact hours variable revealed a significant relation to early study success and improved model fit ($\chi^2(1) = 4.85$, $p < .05$). This model explains 6.0% at the student level and 11.1% at the level of learning communities or mentor groups. Neither of the interaction terms of peer interaction and faculty interaction with learning communities were significant, so we removed them. Gender and prior achievement as control variables appear significantly related to early study success. Compared with Model 3, the final Model 4 improves significantly, without the control variables ($\chi^2(2) = 153.02$, $p < .001$). This model explains 19.8% of the variance at the student level and 25.8% at the level of the learning communities or mentor groups.

Table 3-4. Multilevel analysis of the predictors of study success after the first semester

	Model 0	Model 1	Model 2	Model 3	Model 4	Model 5
	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)
Fixed effects						
Intercept	6.374** (0.088)	6.404** (0.184)	6.459** (0.184)	6.712** (0.208)	5.970** (0.268)	6.126** (0.258)
Faculty interaction		0.244* (0.120)	0.183 (0.119)	0.165 (0.119)	0.167 (0.116)	0.219 (0.113)
Peer interaction		0.004 (0.155)	-0.089 (0.154)	-0.017 (0.156)	-0.088 (0.152)	0.018 (0.148)
Self-efficacy			0.613** (0.162)	0.577** (0.162)	0.755** (0.163)	0.485* (0.165)
Learning communities		-0.041 (0.210)	-0.111 (0.211)	-0.418 (0.242)	-0.200 (0.246)	-0.203 (0.232)
Contact hours				0.031* (0.014)	0.024 (0.014)	0.018 (0.013)
Control variables						
Gender					0.725** (0.166)	0.559** (0.167)
Prior achievement						0.766** (0.118)
Variance						
Student	1.851 (0.137)	1.826 (0.136)	1.752 (0.130)	1.757 (0.130)	1.668 (0.124)	1.503 (0.116)
Learning communities	0.133 (0.073)	0.137 (0.074)	0.153 (0.076)	0.109 (0.066)	0.119 (0.066)	0.088 (0.058)
Explained variance						
R^2 level 1		1.06%	3.98%	5.95%	9.93%	19.81%
R^2 level 2				11.08%	10.18%	25.76%
ICC	0.07	0.08	0.09	0.06	0.07	0.06
Model fit						
Deviance statistic (-2*Log-likelihood)	1424.227	1419.431	1405.400	1400.551	1381.934	1247.530
Number of estimated parameters	3	6	7	8	9	10

Note. Adding the peer interaction× LCs and faculty interaction × LCs interaction terms produced non-significant results, so we removed them from Model 3. For gender, the reference category is men. For learning communities, the reference category is mentor groups.
**p ≤ .001 *p ≤ .05.

3.4 Conclusion and discussion

In response to the performance agreements between universities and the Dutch government, designed to enhance performance rates, many universities implemented small group teaching, such as learning communities. These efforts reflect theoretical predictions that interpersonal integration contributes to performance (Tinto, 1993; Vygotsky, 1978), such that learning communities might contribute to students' successful transition to university by reducing their socialization and adaptation difficulties (Beerkens-Soo & Vossensteyn, 2009; Christie et al., 2004; Rausch & Hamilton, 2006). International research

already has established various positive effects of learning communities (Butler & Dawkins, 2008; Stefanou & Salisbury-Glennon, 2002; Zhao & Kuh, 2004); the current study focuses particularly on small group teaching in the Dutch university context during the first semester and offers a novel, empirical comparison of learning communities with a fixed composition with mentor groups who just meet weekly.

We find support for the predicted positive relationships among peer and faculty interaction, self-efficacy, and early study success. Peer and faculty interactions and learning communities relate significantly to self-efficacy. The positive contribution of interactions to self-efficacy likely arises because students can compare themselves with others in learning communities, observing how fellow students succeed or obtain better grades (Bandura, 1977a, b; Usher & Pajares, 2008). Self-efficacy also has a positive effect on early study success. In contrast with peer interaction, faculty interaction relates significantly to early study success. The finding that peer interaction relates directly to self-efficacy and indirectly to early study success is accordant with recent findings about the determinants of early study success (Brouwer, Jansen, Hofman, & Flache, 2016b).

The partial support for the second hypothesis revealed that learning communities, compared with mentor groups, exhibited stronger positive relationships of faculty interaction with self-efficacy. In learning communities, faculty interaction exerted a more positive effect on self-efficacy; more contact hours also contributed to self-efficacy. We found no differences between learning communities and mentor groups in terms of the effects of faculty interaction on early study success or of peer interaction on self-efficacy. Furthermore, we uncovered some differential effects for individual characteristics and capacities, which appear to be the most important predictors of self-efficacy and early study success, in line with prior findings (Jansen, 2004; Richardson et al., 2012; Robbins et al., 2004). Women achieved better performance than men but scored lower on self-efficacy. Prior skills and prior achievement had strongly positive influences on self-efficacy and early study success. Independent of the type of small group teaching approaches used, students' prior knowledge and gender seemingly offered the best predictive power with regard to study success and self-efficacy. This finding raises the question about whether learning communities have stronger effects for some students, such as those with higher achievement levels when they enter the university. Further research into the differential effects of various forms of student support across specific types of student groups may shed more light on this question. The practical implications for determining the composition of learning communities also require some further insights. To the best of our knowledge, no research investigates the group composition of learning communities. For example, should initial student groups be heterogeneous or more homogenous in their composition, in terms of knowledge, self-efficacy, and gender, to ensure that the new students benefit optimally from the resulting support system and reach their achievement potential?

Several limitations of the study also require consideration. First, the effect sizes were small, and the marginal differences might result from several factors. For example, students in mentor groups might collaborate, on their own volition, in other lectures or projects, such that their interaction levels would be similar to those in learning communities. The mentor groups also consisted mainly of women, which might have biased the effects. Other variables might influence self-efficacy and study success too, such that they could mediate

the relationships we study. Further research with an experimental design or comparisons with additional small group teaching methods thus would be helpful. Second, with our cross-sectional design, we cannot offer strong causal inferences. A longitudinally cross-lagged panel design could demonstrate how peer and faculty interaction, self-efficacy, and study success develop through small group teaching over time. Mediation effects also could be tested with a longitudinal design (Little, 2013). Third, we used student self-reports, which provide insight into dynamic interactions among students and teachers in groups. Additional investigation of which groups can be observed actually to engage in collaborative learning might clarify the actual participation of students, the interactions among students, and the interactions between students and teachers, which can help leverage their self-efficacy development.

Finally, the current study reveals that peer and faculty interactions are mechanisms for improving self-efficacy and early study success. Teachers and mentors can contribute to this enhancement of self-efficacy by providing positive feedback, enabling students to collaborate with one another, and offering opportunities for peer tutoring (O'Donnell, 2006; Rausch & Hamilton, 2006). The empirical differences between learning communities and mentor groups are relatively small when it comes to the effect of faculty interactions on self-efficacy; we find no differences for the influence of peer interaction on self-efficacy. The variation in contact hours seems insufficient to differentiate learning communities and mentor groups with regard to their peer interaction. In addition to attending all lectures together, as a fixed group, it might be useful to offer integrated study material, together with active work formats (Van den Berg & Hofman, 2005), or else to implement thematic learning communities (Stassen, 2003) that also include extracurricular activities. Although individual capacities and characteristics mainly determine the level of enhanced self-efficacy and performance rates, and the effects of interactions are relatively small, interactions with fellow students and teachers or mentors still can help contribute to support individual students—and even might make the difference between university study success and failure.

3.5 Notes

1 The percentage of the variance at the group level is determined by the ICC, for which variance at the second level is divided by total variance (Snijders & Bosker, 2012).

2 The explained variance is calculated as 1 minus (first-level variance fitted model + second-level variance fitted model)/(first-level variance null model + second-level variance null model). The explained variance at the second level is calculated the same way, except that first-level variance gets divided by the group size *n*, or 12 for our study (Hox, 2010; Snijders & Bosker, 2012).

3 Despite an ICC value of 0, we chose a multilevel analysis for all the models, because the data structure with two levels of students is nested in groups. The ICC of the empty model on early study success indicates clustering at the group level (ICC = .07). Moreover, Hayes (2006) emphasizes that with an ICC of 0, a multilevel analysis provides benefits, including information about model fit and variance at the first level.